

Project #4

Due Dates: Monday, July 11 at 11:59pm

Submit: eLearning

Late Policy: -10 points per hour late

Instructions: This is an individual assignment. All work should be your own.

Objective:

Work with hash tables by creating a hash table using linear probing.

Description:

Create a generic class called `LinearProbingHashTable<K,V>`.
This class implements a hash table, which maps keys of type `K` to values of type `V`.

It should contain a private static class, `Entry<K,V>`.

Because Java cannot create an array of a generic class, create the array for the table like this:

```
Entry<K,V> table[];    // declare generic
table = new Entry[size]; // create as non-generic
```

Note that this will generate a warning message when compiled.

Your class should have the following methods. The methods should all operate on the object making the call (none are static).

Perform checking of the parameters and throw exceptions where appropriate.

You may use code from the textbook, but all other code must be your own.

15 points

a) `public boolean insert(K key, V value)`
 inserts entry, rehashes if half full,
 can re-use deleted entries, throws
 exception if key is null, returns
 true if inserted, false if duplicate.

15 points

b) `public V find(K key)`
 returns value for key, or null if not found

15 points

c) `public boolean delete(K key)`
 marks the entry deleted but leaves it there,
 returns true if deleted, false if not found

15 points

d) `private void rehash()`
 doubles the table size, hashes everything to
 the new table, omitting items marked deleted

10 points

e) public int getHashLocation(K key)
 returns the hash location for the given key,
 or -1 if not found.
 (this is the location before probing occurs)

10 points

f) public int getProbingLocation(K key)
 returns the probing location for the given key,
 or -1 if not found.
 (this is the location after probing occurs)

10 points

g) public String toString()
 returns a formatted string of the hash table:
 0 null
 1 xxxxx
 2 yyyyy
 ...

10 points

h) public static void main(String args[])
 demonstrate each of your methods

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LinearProbingHashTable.java